In the claims:

1. (Currently amended) A method comprising the steps of:

mixing an alginate salt and a source of calcium ions to provide a mixture;

adding a calcium releasing compound to the mixture to provide a three-dimensional crosslinked hydrogel system; and

selectively controlling shrinking, swelling or maintaining of the hydrogel system by varying a calcium ion concentration of a separate medium into which the hydrogel system is introduced;;

wherein the hydrogel system swells at calcium ion concentrations in the medium between about 0.0005 M and about 0.0010 M; wherein the hydrogel system shrinks at a calcium ion concentration in the medium of about 0.0040 M; and wherein the hydrogel system remains substantially the same size at calcium ion concentrations in the medium between about 0.0020 M and about 0.0030 M.

2. (Currently amended) The method of Claim 1, further comprising the step of culturing the three-dimensional crosslinked hydrogel system in ~~a~~ the medium for growing cells in vitro.

3. (Previously amended) The method of Claim 1, wherein the alginate salt is selected from the group consisting of sodium alginate and potassium alginate.

4. (Previously amended) The method of Claim 1, wherein the alginate salt is prepared from an alginate source selected from Macrocystis pyrifera and Laminaria hyperborea.

5. (Previously amended) The method of Claim 1, wherein the source of calcium ions is selected from the group consisting of calcium carbonate, calcium sulfate, and calcium sulfate dihydrate.

6. (Previously amended) The method of Claim 1, wherein the calcium releasing compound is D-glucono-δ-lactone.

7. (Previously amended) The method of Claim 1, wherein the source of calcium ions is calcium carbonate and the calcium releasing compound is D-glucono-δ-lactone, and wherein the molar ratio of the calcium carbonate to the D-glucono-δ-lactone is 0.5.

8. (Previously amended) The method of Claim 1, further comprising the step of implanting the three-dimensional crosslinked hydrogel system.

9. (Previously amended) The method of Claim 1, wherein the three-dimensional crosslinked hydrogel system has a thickness of between about 4 mm and about 8 mm, and a diameter of approximately 18 mm.

10. (Previously amended) The method of Claim 1, wherein the three-dimensional crosslinked hydrogel system has a calcium ion to carboxyl molar ratio of 0.27.

11. (Currently amended) A method for tissue engineering *in vitro*, the method comprising the steps of:

mixing cells, an alginate salt and a source of calcium ions to provide a mixture;

adding a calcium releasing compound to the mixture to provide a crosslinked hydrogel;

selectively controlling shrinking, swelling or maintaining of the crosslinked hydrogel by varying a calcium ion concentration of a separate medium into which the crosslinked hydrogel is introduced; and

culturing the crosslinked hydrogel in the medium to provide a three-dimensional crosslinked hydrogel/cell system for growing the cells *in vitro*;

wherein the hydrogel system swells at calcium ion concentrations in the medium between about 0.0005 M and about 0.0010 M; wherein the hydrogel system shrinks at a calcium ion concentration in the medium of about 0.0040 M; and wherein the hydrogel system remains substantially the same size at calcium ion concentrations in the medium between about 0.0020 M and about 0.0030 M.

12. (Previously amended) The method of Claim 11, wherein the alginate salt is selected from the group consisting of sodium alginate and potassium alginate.

13. (Previously amended) The method of Claim 11, wherein the alginate salt is prepared from an alginate source selected from Macrocystis pyrifera and Laminaria hyperborea.

14. (Previously amended) The method of Claim 11, wherein the source of calcium ions is selected from the group consisting of calcium carbonate, calcium sulfate, and calcium sulfate dihydrate.

15. (Previously amended) The method of Claim 11, wherein the calcium releasing compound is D-glucono-δ-lactone.

16. (Previously amended) The method of Claim 11, wherein the source of calcium ions is calcium carbonate and the calcium releasing compound is D-glucono-δ-lactone, and wherein the molar ratio of the calcium carbonate to the D-glucono-δ-lactone is 0.5.

17. (Previously amended) The method of Claim 11, further comprising the step of implanting the three-dimensional crosslinked hydrogel/cell system.

18. (Previously amended) The method of Claim 11, wherein the three-dimensional crosslinked hydrogel/cell system has a thickness of between about 4 mm and about 8 mm, and a diameter of approximately 18 mm.

19. (Previously amended) The method of Claim 11, wherein the three-dimensional crosslinked hydrogel/cell system has a calcium ion to carboxyl molar ratio of 0.27.

20. (Previously amended) The method of Claim 11, wherein the cells are osteoblasts.

22. (Cancelled)

23. (Currently amended) A method for preparing a three-dimensional hydrogel system, the method comprising the steps of:

adding a calcium-releasing compound to a mixture of at least one hydrophilic polymer comprising an alginate salt and a source of calcium cations to provide a three-dimensional crosslinked hydrogel system; and

selectively controlling shrinking, swelling or maintaining of the hydrogel system by varying a calcium ion concentration of a separate medium into which the hydrogel system is introduced~~,~~;

wherein the hydrogel system swells at calcium ion concentrations in the medium between about 0.0005 M and about 0.0010 M; wherein the hydrogel system shrinks at a calcium ion concentration in the medium of about 0.0040 M; and wherein the hydrogel system remains substantially the same size at calcium ion concentrations in the medium between about 0.0020 M and about 0.0030 M.

25. (Previously amended) The method as defined in claim 23 wherein the alginate salt is selected from the group consisting of sodium alginate and potassium alginate.

26. (Previously amended) The method as defined in claim 23, wherein the source of calcium ions is selected from the group consisting of calcium carbonate, calcium sulfate, and calcium sulfate dihydrate.

27. (Previously added) The method as defined in claim 26 wherein the calcium releasing compound is D-glucono-δ-lactone.

28. (Previously added) The method as defined in claim 27 wherein the source of calcium ions is calcium carbonate, and wherein the molar ratio of the calcium carbonate to the D-glucono-δ-lactone is 0.5.

29. (Previously amended) The method as defined in claim 23 wherein the three-dimensional crosslinked hydrogel system has a calcium ion to carboxyl molar ratio ranging between about 0.09 and about 0.9.

30. (Previously added) The method as defined in claim 29 wherein the calcium ion to carboxyl molar ratio ranges between about 0.18 and about 0.72.

32. (Cancelled)

33. (Previously amended) The method as defined in claim 23, further comprising the step of culturing the three-dimensional crosslinked hydrogel system in the medium for growing cells in vitro.

34. (Currently amended) A three-dimensional crosslinked hydrogel composition, consisting essentially of:

at least one hydrophilic polymer comprising an alginate salt;

a source of calcium cations;

a calcium-releasing compound, whereby a mixture of the at least one hydrophilic polymer, the source of calcium cations and the calcium-releasing compound forms the crosslinked hydrogel composition; and

a separate culture medium into which the hydrogel composition is introduced, the culture medium having a predetermined calcium ion concentration, wherein the predetermined calcium ion concentration determines the shrinking, swelling or maintaining of the crosslinked hydrogel composition;

wherein the hydrogel system swells at calcium ion concentrations in the medium between about 0.0005 M and about 0.0010 M; wherein the hydrogel system shrinks at a calcium ion concentration in the medium of about 0.0040 M; and wherein the hydrogel system remains substantially the same size at calcium ion concentrations in the medium between about 0.0020 M and about 0.0030 M.

35. (Previously amended) The composition as defined in claim 34, wherein the alginate salt is selected from the group consisting of sodium alginate and potassium alginate; wherein the source of calcium cations is selected from the group consisting of calcium carbonate, calcium sulfate, and calcium sulfate dihydrate; and wherein the calcium-releasing compound is D-glucono-δ-lactone.

36. (Previously added) The composition as defined in claim 35 wherein the source of calcium ions is calcium carbonate, and wherein the molar ratio of the calcium carbonate to the D-glucono-δ-lactone is 0.5.

37. (Previously added) The composition as defined in claim 35 wherein the three-dimensional crosslinked hydrogel system has a calcium ion to carboxyl molar ratio ranging between about 0.09 and about 0.9.

38. (Previously added) The composition as defined in claim 37 wherein the calcium ion to carboxyl molar ratio ranges between about 0.18 and about 0.72.

40. (Previously amended) The composition as defined in claim 34 wherein when the predetermined calcium ion concentration is between about 0.0020 M and about 0.0030 M, the hydrogel composition remains substantially the same size.

41. (Previously amended) The composition as defined in claim 45 wherein the cells are at least one of osteoblasts and cells which secrete a medically useful compound.

42. (Previously added) The method of claim 2 wherein the cells secrete a medically useful compound.

43. (Previously added) The method of claim 11 wherein the cells secrete a medically useful compound.

44. (Previously added) The method of claim 33 wherein the cells are at least one of osteoblasts and cells which secrete a medically useful compound.

45. (Previously added) The three-dimensional crosslinked hydrogel composition as defined in claim 34, further comprising cells incorporated into the hydrogel composition, thereby forming a hydrogel/cell system.

46. (Previously amended) The three-dimensional crosslinked hydrogel composition as defined in claim 34 wherein when the predetermined calcium ion concentration is between about 0.0005 M and about 0.0010 M, the hydrogel composition swelled.

47. (Previously amended) The three-dimensional crosslinked hydrogel composition as defined in claim 34 wherein when the predetermined calcium ion concentration is about 0.0040 M, the hydrogel composition shrank.

48. (Previously added) The method as defined in claim 1 wherein the three-dimensional crosslinked hydrogel system is structurally homogeneous.

49. (Previously added) The three-dimensional crosslinked hydrogel composition as defined in claim 34 wherein the composition is structurally homogeneous.

50. (Previously added) The method as defined in claim 1 wherein the source of calcium ions is in powder form.

51. (Previously added) The three-dimensional crosslinked hydrogel composition as defined in claim 34 wherein the source of calcium cations is in powder form.

52. (Previously amended) A method for preparing a three-dimensional hydrogel system, the method comprising the steps of:

adding a calcium-releasing compound to a mixture of at least one hydrophilic polymer comprising an alginate salt and a source of calcium cations to provide a three-dimensional crosslinked hydrogel system, wherein the calcium releasing compound is D-glucono-δ-lactone, wherein the alginate salt is selected from the group consisting of sodium alginate and potassium alginate, and wherein the source of calcium ions is selected from the group consisting of calcium carbonate, calcium sulfate, and calcium sulfate dihydrate; and

selectively controlling shrinking, swelling or maintaining of the hydrogel system by varying a calcium ion concentration of a separate medium into which the hydrogel system is introduced, wherein the hydrogel system swelled at calcium ion concentrations between about 0.0005 M and about 0.0010 M; wherein the hydrogel system shrank at a calcium ion concentration of about 0.0040 M; and wherein the hydrogel system remained substantially the same size at calcium ion concentrations between about 0.0020 M and about 0.0030 M;

wherein the three-dimensional crosslinked hydrogel system has a calcium ion to carboxyl molar ratio ranging between about 0.09 and about 0.9.

53. (Previously added) The method as defined in claim 52 wherein the source of calcium ions is calcium carbonate, and wherein the molar ratio of the calcium carbonate to the D-glucono-δ-lactone is 0.5.

54. (Previously added) The method as defined in claim 53 wherein the calcium ion to carboxyl molar ratio ranges between about 0.18 and about 0.72.

55. (Previously amended) The method as defined in claim 54, further comprising the step of culturing the three-dimensional crosslinked hydrogel system in the medium for growing cells *in vitro*.